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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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|-----------------|-------------|----------------------|---------------------|------------------|

10/815,272

03/31/2004

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34911.P18988

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7590 11/15/2007
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| EXAMINER |
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PARK, ILWOO

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| ART UNIT | PAPER NUMBER |
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2182

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| MAIL DATE | DELIVERY MODE |
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11/15/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/815,272

Applicant(s)

BROWN ET AL.

Examiner

Ilwoo Park

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 May 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1, 8, 17, and 24 are amended in response to the last office action. Claims 1-31 are presented for examination.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 2, 5-18, and 21-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yu [US 5,764,903] in view of Skazinski et al. [US 6,574,709 B1].

As for claim 1, Yu teaches an apparatus comprising:

an integrated circuit (IC) configured to receive [col. 4, lines 50-60] an input/output (I/O) request to write data stored on at least one target device comprised in at least one local storage array [e.g., local disk 16 in fig. 1; col. 1, lines 43-47] and generate [col. 10, lines 33-37] one or more I/O transactions capable of writing data on at least one target device comprised in at least one remote storage array [e.g., remote disk 34 in fig. 1; col. 1, lines 43-47].

Though Yu discloses that the data mirroring includes at least one data block transmitted during said one or more I/O transactions which was not successfully written to said at least one remote storage array [col. 8, lines 59-64] and retries said one or more I/O transactions including data blocks, Yu does not explicitly disclose a counter configured to include at least one bit corresponding to the at least one data block which

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was not successfully written. Skazinski et al teach data mirroring includes tracking data and retries at least one data block transmitted which was not successfully written [col. 15, lines 40-46]; specifically, Skazinski et al teach a counter configured to include at least one bit corresponding to the at least one data block which was not successfully written [col. 20, lines 5-19] used for retrying data. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the counter including at least one bit corresponding to the at least one data block which was not successfully written in order to identify the data blocks failed for the retry.

4. As for claims 2 and 18, Yu teaches said integrated circuit is further capable of generating one or more I/O transactions capable of writing data on at least one target device comprised in at least one local storage array [col. 10, lines 33-37].

5. As for claims 5 and 21, the combination of Yu and Skazinski et al teaches said local storage array and said remote storage array each comprises a redundant array of inexpensive disks (RAID) each comprising at least one of RAID Level 0, RAID Level 10, and RAID Level 1E storage arrays [Skazinski et al: col. 9, lines 5-8].

6. As for claims 6 and 22, the combination of Yu and Skazinski et al teaches said local storage array and said remote storage array each comprises a transaction to stripe data on at least one of said of RAID Level 0, RAID Level 10, and RAID Level 1E storage arrays in response to said I/O request to write data stored on at least one target device comprised in at least one local storage array [Skazinski et al: col. 9, lines 5-8].

7. As for claims 7 and 23, Yu teaches said integrated circuit capable of receiving [col. 11, lines 47-52] an input/output (I/O) request to read data stored on at least one

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target device comprised in at least one local storage array, said integrated circuit further capable of generating [col. 10, lines 33-37] one or more I/O transactions capable of reading data on at least one target device comprised in at least one remote storage.

8. As for claim 8, Yu teaches a method comprising:

receiving [col. 4, lines 50-60] an input/output (I/O) request to write data stored on at least one target device comprised in at least one local storage array [e.g., local disk 16 in fig. 1; col. 1, lines 43-47]; and

generating [col. 10, lines 33-37] one or more I/O transactions configured to write data on at least one target device comprised in at least one remote storage array [e.g., remote disk 34 in fig. 1; col. 1, lines 43-47].

Though Yu discloses that the data mirroring includes at least one data block transmitted during said one or more I/O transactions which was not successfully written to said at least one remote storage array [col. 8, lines 59-64] and retries said one or more I/O transactions including data blocks, Yu does not explicitly disclose incrementing at least one bit corresponding to the at least one data block which was not successfully written. Skazinski et al teach data mirroring includes tracking data and retries at least one data block transmitted which was not successfully written [col. 15, lines 40-46]; specifically, Skazinski et al teach incrementing at least one bit corresponding to the at least one data block which was not successfully written [col. 20, lines 5-19] used for retrying data. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the counter including at least one bit

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corresponding to the at least one data block which was not successfully written in order to identify the data blocks failed for the retry.

9. As for claim 9, Yu teaches generating one or more I/O transactions to mirror data on said local storage array and said remote storage array [col. 2, lines 16-24].

10. As for claim 10, Yu teaches generating one or more I/O transactions to stripe data on said local storage array and said remote storage array [col. 9, lines 35-42].

11. As for claim 11, Yu teaches receiving [col. 11, lines 47-52] an input/output (I/O) request to read data stored on at least one target device comprised in at least one local storage array; and generating [col. 10, lines 33-37] one or more I/O transactions capable of reading data on at least one target device comprised in at least one remote storage array.

12. As for claim 12, Yu teaches determining the status of said remote storage array, and, if said remote storage array is incapable of transmitting data in response to said one or more I/O transactions, regenerating said one or more I/O transactions to read data to said remote storage array at one or more preselected times [col. 6, lines 42-55; col. 11, lines 47-52].

13. As for claim 13, Yu teaches storing information based on data unread from said remote storage array on said local storage array, and, retrieving said information based on data unread from said local storage array [e.g., col. 6, lines 53-56; col. 11, lines 47-52].

14. As for claim 14, Yu teaches determining the status of said remote storage array, and, if said remote storage array is incapable of receiving data, regenerating said one or

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more I/O transactions to write data to said remote storage array at one or more preselected times [col. 6, lines 42-55].

15. As for claim 15, Yu teaches storing information based on data unwritten data related to said I/O transactions to write data to said remote storage array, and, retrieving said information based on data unwritten data to said remote storage array [col. 6, lines 53-56].

16. As for claim 16, Yu teaches copying data from said at least one target device comprised in said at least one remote storage array to said at least one target device comprised in said local storage array [col. 11, lines 50-52].

17. As for claim 17, Yu teaches a system, comprising:

a circuit card comprising an integrated circuit (IC) configured to communicate in accordance with a plurality of different communication protocols [e.g., col. 4, lines 8-11], the circuit card (IC) configured to be coupled to a bus, and said IC(IC) configured to receive [col. 4, lines 50-60] an input/output (I/O) request to write data stored on at least one target device comprised in at least one local storage array [e.g., local disk 16 in fig. 1; col. 1, lines 43-47], said IC further configured to generate [col. 10, lines 33-37] one or more I/O transactions configured to write data on at least one target device comprised in at least one remote storage array [e.g., remote disk 34 in fig. 1; col. 1, lines 43-47].

Though Yu discloses that the data mirroring includes at least one data block transmitted during said one or more I/O transactions which was not successfully written to said at least one remote storage array [col. 8, lines 59-64] and retries said one or more I/O transactions including data blocks, Yu does not explicitly disclose a counter

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configured to include at least one bit corresponding to the at least one data block which was not successfully written. Skazinski et al teach data mirroring includes tracking data and retries at least one data block transmitted which was not successfully written [col. 15, lines 40-46]; specifically, Skazinski et al teach a counter configured to include at least one bit corresponding to the at least one data block which was not successfully written [col. 20, lines 5-19] used for retrying data. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the counter including at least one bit corresponding to the at least one data block which was not successfully written in order to identify the data blocks failed for the retry.

18. Regarding claims 24-31, these constitute the article comprising a storage medium having stored thereon instructions that when executed by a machine result in the limitations of the method disclosed in previously rejected claims. These present claims are rejected under the same basis.

19. Claims 3, 4, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yu and Skazinski et al as applied to claims 1 and 17 above, and further in view of well known in the art.

As for claims 3 and 19, though the combination of Yu and Skazinski et al teaches said local storage array and said remote storage array each comprises a redundant array of inexpensive disks (RAID), the combination does not expressly disclose the RAID comprises RAID Level 1 storage arrays.

However, it is well known in the art of RAID having RAID Level 0, RAID Level 1, RAID Level 10, or RAID Level 1E storage arrays. At the time of the invention, it would

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have been obvious to one of ordinary skill in the art to modify to include RAID Level 0, RAID Level 1, RAID Level 10, or RAID Level 1E storage arrays in order to increase applicability of mirroring and striping in the RAID of Yu.

20. As for claims 4 and 20, the combination of Yu and well known in the art teaches a transaction to mirror data on at least one of said RAID Level 0, RAID Level 1, RAID Level 10, and RAID Level 1E storage array in response to said I/O request to write data stored on at least one target device comprised in at least one local storage array [col. 10, lines 33-37; col. 1, lines 43-47].

Conclusion

21. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

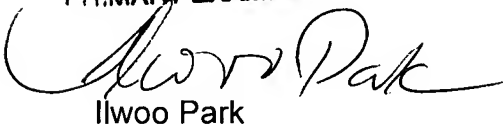
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ilwoo Park whose telephone number is (571) 272-4155. The examiner can normally be reached on Monday through Friday from 9:00 AM to 5:30

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PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Henry Tsai can be reached on (571) 272-4176. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ILWOO PARK
PRIMARY EXAMINER

A handwritten signature in black ink, appearing to read 'Ilwoo Park', written over the printed name.

Ilwoo Park

October 31, 2007